CLAIMS

1. In a graphics processing system, a method of altering color values of a pixel along a surface function having an interpolated normal vector, comprising:

adding a displacement vector to the interpolated normal vector to produce a perturbed normal vector, the displacement vector calculated from the equation:

$$D = (fu * Pu * scaleu) + (fv * Pv * scalev),$$

where D is the displacement vector, Pu and Pv are perpendicular vectors tangent to the surface function at the pixel, fu and fv are displacement values along Pu and Pv, respectively, and scaleu and scalev are scaling values; and

generating color values for the pixel based on the perturbed normal vector instead of the interpolated normal vector.

2. The method of claim 1 wherein Pu, Pv, the perturbed normal vector, and the displacement vector comprise three coordinate vectors.

3. The method of claim 1, further comprising normalizing the perturbed normal vector.

4. The method of claim 1 wherein fu and fv represent partial derivatives of a function defining a texture applied to the surface.

5. The method of claim 4 wherein fu and fv comprise bilinearly filtered values.

6. In a graphics processing system, a method for altering color values of a pixel having a normal vector normal to a surface in which the pixel is located, the method comprising calculating the color values for the pixel based on a perturbed normal vector having a displacement from the interpolated normal vector, the displacement equal to:

a first vector tangent to the surface at the location of the pixel scaled by a first scale factor and a first displacement value, and

a second vector tangent to the surface at the location of the pixel and scaled by a second scale factor and a second displacement value, the second vector perpendicular to the first vector.

7. The method of claim 6, further comprising normalizing the perturbed normal vector.

8. The method of claim 6 wherein the first and second displacement values comprise values representative of partial derivatives for a first and second variable, respectively, of a function defining a texture applied to the surface.

9. The method of claim 8 wherein the first and second displacement values comprise bilinearly interpolated values.

10. The method of claim 6 wherein the first and second scale factors comprise unequal values.

11. A method for providing surface texture in a graphics image, comprising:

determining a normal vector for a pixel having a location along a surface;

adding a displacement vector to the normal vector to produce a perturbed normal vector, the displacement vector calculated from the sum of:

a first vector tangent to the surface at the location of the pixel scaled by a first scale factor and a first displacement component, and

a second vector perpendicular to the first vector and tangent to the surface at the location of the pixel and scaled by a second scale factor and a second displacement component; and

calculating color values for the pixel based on the perturbed normal vector instead of the normal vector.

12. The method of claim 11 wherein the surface corresponds to a polygon having vertices, and determining a normal vector for the pixel comprises interpolating the normal vector from first and second normal vectors normal to the surface at locations corresponding to first and second vertices of the polygon.

13. The method of claim 11, further comprising normalizing the perturbed normal vector.

14. The method of claim 11 wherein the first and second displacement components comprise values representative of partial derivatives for a first and second variable, respectively, of a function defining a texture applied to the surface.

15. The method of claim 14 wherein the first and second displacement components comprise bilinearly interpolated values.

16. The method of claim 11 wherein the first and second scale factors comprise unequal values.

17. A computer graphics processing system for calculating color values of pixel having a location along a surface, comprising:

a gradient mapping circuit to calculate for the pixel a perturbed normal vector displaced from a normal vector normal to the surface at the location of the pixel by a displacement vector, the displacement vector equal to the sum of:

a first vector tangent to the surface at the pixel scaled by a first scale factor and a first displacement component, and

a second vector tangent to the surface at the pixel and scaled by a second scale factor and a second displacement component, the second vector perpendicular to the first vector.

18. The computer graphics processing system of claim 17 wherein the gradient mapping circuit normalizes the perturbed normal vector.

19. The computer graphics processing system of claim 17 wherein the first and second displacement values comprise values representative of partial derivatives for a first and second variable, respectively, of a function defining a texture applied to the surface.

20. The computer graphics processing system of claim 19 wherein the first and second displacement values comprise bilinearly interpolated values.

21. The computer graphics processing system of claim 17 wherein the first and second scale factors comprise unequal values.

22. A computer graphics processing system for calculating color values of pixels representing a surface, comprising a gradient mapping circuit to calculate for each pixel a value representative of a displacement vector having first and second perpendicular components, the first component equal to the product of a first vector tangent to the surface at the pixel, a first scale factor, and a first displacement component along the first vector, and the second component equal to the product of a second vector tangent to the surface at the pixel, a second scale factor, and a second displacement component along the second vector.

23. A computer system, comprising:

a system processor;

a system bus coupled to the system processor;

a system memory coupled to the system bus;

a display; and

a graphics processing system coupled to the system bus and the display for calculating color values of a pixel having a location along a surface and providing graphics data to the display, the graphics processing system comprising:

a gradient mapping circuit to calculate for the pixel a perturbed normal vector displaced from a normal vector normal to the surface at the location of the pixel by a displacement vector, the displacement vector equal to the sum of:

a first vector tangent to the surface at the pixel scaled by a first scale factor and a first displacement component, and

a second vector tangent to the surface at the pixel and scaled by a second scale factor and a second displacement component, the second vector perpendicular to the first vector.

24. The computer system of claim 23 wherein the gradient mapping circuit normalizes the perturbed normal vector.

25. The computer system of claim 23 wherein the first and second displacement values comprise values representative of partial derivatives for a first and second variable, respectively, of a function defining a texture applied to the surface.

26. The computer system of claim 25 wherein the first and second displacement values comprise bilinearly interpolated values.

27. The computer system of claim 23 wherein the first and second scale factors comprise unequal values.